DOCUMENT RESUME

ED 269 696 CG 019 083

AUTHOR Gattiker, Urs E.; And Others
TITLE Computers in the Workplace.
INSTITUTION Lethbridge Univ. (Alberta).
SPONS AGENCY Social Sciences and Humanities Research Council of Canada, Ottawa (Ontario).
PUB DATE 86
CONTRACT 86-1934-405; 11149
NOTE 28p.; For related documents, see CG 019 084-085. An earlier version of this paper was presented at the International Scientific Conference: "Work with Display Units" (Stockholm, Sweden, May 12-15, 1986).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Administrators; Careers; *Computers; *Employee Attitudes; Foreign Countries; Job Satisfaction; Quality of Life; *Role Conflict; Self Concept; *Success; Work Attitudes; *Work Environment
IDENTIFIERS Canada

ABSTRACT

It is expected that by 1990 the majority of clerical and managerial workers in North America will use computers in their daily work. An integrative model was developed which views quality of work life as an ever changing dimension influenced by computerization and by perception of career success and non-work factors. To test this model, a study examining various aspects of computerization and their effects upon quality of work life in organizations was conducted. Employers from 10 large firms, 12 medium-sized companies, 3 educational institutions, and 3 government agencies in western Canada selected equal numbers (3-6) of successful managers and support personnel from a variety of departments. Selected employees (N=306) anonymously completed questionnaires designed to assess respondents' present positions in terms of success, and also their perception of the technology available to them. The results partially support the model in that workers who were accepting computerization positively were more likely to exhibit organizational commitment. In addition, computerization and perception of career success had an impact on the individual's role ambiguity and role conflict in the workplace. Disconfirming findings showed that the additivity theme prevalent in the stress literature was not supported when applied to the computerization process. Future research should investigate the causal relationships between the factors assessed here and such behavioral outcomes as absenteeism and turnover. (NB)

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COMPUTERS IN THE WORKPLACE[1]

Urs E. Gattiker

Todd Nelligan

Larry Coe

Rosemarie S. Gattiker

The University of Lethbridge

CG 019083

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Running head: Computerization & Quality of Work Life

[1]Financial support for this research project was provided by the Social Sciences and Humanities Research Council of Canada and The University of Lethbridge Research Fund, under Contract No. 86-1934-405, and by a grant from the Alberta Manpower "STEP" Program, Contract No. 11149. An earlier version of this paper was presented at the International Scientific Conference: Work with Display Units, Stockholm, 1986. Requests for reprints should be addressed to Urs E. Gattiker, Technology Research Group, School of Management, The University of Lethbridge, Lethbridge, Alberta, T1K 3M4, CANADA. Telephone: (403) 320-6966 or 329-2169.

COMPUTERS IN THE WORKPLACE

Abstract

This paper examines various aspects of computerization and their effects upon quality of work life in organizations. An integrative model was developed which views quality of work life as an ever changing dimension influenced not only by computerization but also by perception of career success as well as non-work factors. Evaluation of gathered data supported the model in that workers experiencing computerization positively were more likely to exhibit organizational commitment. Furthermore, computerization and perception of career success had an impact upon the individual's role ambiguity and role conflict in the workplace. Supportive and disconfirming findings are discussed, with future directions for organizational research outlined. Implications for practitioners are pointed out as well.

COMPUTERS IN THE WORKPLACE

It is expected that by the end of this decade the majority of clerical as well as managerial workers in North America will use computers in their daily work (Giuliano, 1982; Gutek, 1983). The impact of computerization upon job design and work structure has already been substantial, making it an area of considerable interest for human resource management. However, most of the relevant research has dealt with such areas as human factors engineering, financing and organizational design (e.g., Lieberman, Selig & Walsh, 1982, chap. 1 & 2). Furthermore, policy and strategy issues as related to computer technology have taken most of the limelight in organizational literature (Megaw & Lloyd, 1984; Pava, 1983), while human resource aspects have largely been ignored even though additional research in this area is deemed necessary (Kahn, 1981).

The introduction of computer-based office information technology has usually been technology-driven, without thorough consideration of potentially negative effects upon human resources and the quality of work life (Gattiker, 1984). This approach is forced on management by the fact that the effects of innovation on personnel are often uncertain at the time of its adoption (Kahn, 1981). Technological advances may seem to provide a competitive edge, but the company adopting them will also have to cope with the "growing pains" common to innovators. One issue concerns the attitudes and beliefs about the new technology by the workforce (Dierkes & von Thienen, 1984). As some researchers have pointed out, employee perceptions about career success and the computerization of their work can affect their organizational commitment (cf. Mowday, Porter & Steers, 1982, chap. 3). Furthermore, computer attitudes and career success perceptions can affect role conflict/ambiguity (Gattiker & Coe, in press). However, a satisfactory quality of work life is crucial to the full utilization of technology

(Kahn, 1981).

This paper presents an exploratory causal model of employee attitudes and role perceptions as computerization is more widely implemented. The model integrates and expands upon previous theory and research in several related areas. Its purpose is to specify antecedents and consequences of working with computers, and to examine how those perceptions may affect organizational commitment and role conflict/ambiguity. So far, findings that bear on these issues have been presented in piecemeal fashion, but more comprehensive, integrative studies are lacking.

Literature Review

Computerization and the Transformation of the Workplace

Apart from its impact upon the skill base of a company's workers, computer technology is expected to alter fundamentally the conditions of employment in organizations. Potential problems with computerization have already been specified in the literature and noted in field studies (e.g., Kling, 1978). As a consequence of such automation, many tasks could emerge as less challenging by becoming more routine and repetitive (Shepard, 1971, chap. 4). Therefore, it is in the interest of both the organization and its employees to interpret the ever increasing use of office technology as an improvement in the quality of work life (Kahn, 1981). Indeed, one recent study showed that personal computers were perceived as being most helpful in improving work effectiveness and the quality of work life (Gattiker, Gutek & Berger, 1985).

Other relevant concerns are performance and control as perceived by employees (Salzman & Mirvis, 1985). Although computers may take credit for improving efficiency and effectiveness on the job, they can also provide new avenues of control for management which could lead to worker hostility and unrest (Mankin, Bikson & Gutek, 1982). However, very little empirical research has been done in this area (e.g., Kling & Iacono, 1984).

Still another related factor is communication. Some technologies are more useful for this purpose than others, but the computer appears to have become an important new tool capable of improving communications. Yet research has shown that people communicating via computers evaluated each other less favorably than did people dealing face-to-face (Kiesler, Zubrow, Moses & Geller, 1985). This result is of crucial significance since a major part of office work involves the exchange of large amounts of data and information (Doswell, 1983; Panko, 1984).

Attitudes toward computer-based technology. Most new technologies are acquired in hopes of facilitating higher productivity and job satisfaction (Bodmer, 1982; Gutek, 1983). However, the relative neglect of user attitudes in the study of office information technology could be detrimental to these goals. Objective factors, such as the technology in a person's work environment, affect subjective factors (e.g., perception of work) which in turn influence individual responses (productivity and absenteeism) (see Kahn, 1981; Katz & Kahn, 1978, pp. 577-609).

Organizations need to stay on top of the latest technological developments to remain competitive. At the same time, they ought to make sure that their staff adapts to the altered working conditions created by the introduction of new technology. Employees should feel comfortable with it and perceive it as being helpful in their work (Gutek, 1983). It appears sensible, therefore, to expand the concept of organizational and individual fit by including technological constraints as well. As a result, human resource specialists and organizational researchers should consider individual, organizational and technological needs when trying to obtain a good match between a position and a potential employee (Gattiker, 1984).

Computerization and Career Success

Organizational research conducted to date has concentrated on success from the external career perspective. Numerous popular books suggest

career strategies while specifying educational requirements and the 'proper' entry position to assure hierarchical progression and a successful career (cf. Blank, 1981; Lynch, 1978; Molloy, 1977). Very few studies deal with subjective career success as manifested in the worker's own evaluation of his/her career progress and satisfaction (e.g., Korman, 1980; Larwood & Gattiker, in press).

One recent research project developed a scale for perception of career success of white-collar workers in U.S. metropolitan areas (Gattiker, 1985). Four facets of career success were measured: financial, interpersonal, job and life success. Computerization has seldom changed an employee's level of remuneration nor his/her relationships with peers and management (Gutek, 1983; Pava, 1983). Therefore, a person's perception of financial and interpersonal career success may not necessarily relate to his/her feelings about a technology (cf. Gattiker, 1984). However, since computerization affects skill levels as well as the structure of work, it would be interesting to see if job and life success are related to an individual's assessment of role ambiguity/conflict as well as organizational commitment (cf. Salzman, 1985; Salzman & Mirvis, 1985). Unfortunately, applied tests of these dimensions are virtually non-existent.

Organizational Commitment

This concept reflects a general affective response by the individual to the organization as a whole, including its goals and values (Mowday, Steers & Porter, 1979). Although day-to-day events may have an impact on an employee's job involvement and satisfaction, transitory incidents usually will not cause a person to reevaluate his/her commitment to the organization (Mowday, Porter & Steers, 1982, chap. 2).

Two dimensions of organizational commitment have been identified in organizational research: attitudinal and behavioral (Steers & Porter, 1983, pp. 425-430). While the former is based on the extent to which an individ-

ual identifies with a unit by accepting its goals and values, the latter reflects the employee's feeling of being bound to the organization by benefits which he/she cannot afford to give up. Research data shows that attitudinal commitment can affect such behavioral outcomes as turnover, absenteeism and job performance (e.g., Mowday, Porter & Steers, 1982). Behavioral commitment, on the other hand, will lead to psychological bolstering in the form of dissonance reduction and self-justification processes (Angle, 1983; Steers & Porter, 1983, pp. 425-430). Antecedents of organizational commitment can be social background, perception of career success and employee attitudes toward computers (Angle & Perry, 1981; Gattiker, 1984). Nevertheless, testing of these relationships in different organizational settings is lacking at this time.

Role Conflict and Ambiguity

An especially rich and diverse literature investigating the relationship between role perceptions and work-related attitudes and behaviors has emerged over the past decade. Researchers have linked two specific forms of role stress, role ambiguity and role conflict to many dysfunctional work-related variables (for recent reviews, see Fisher & Gitelson, 1983; Jackson & Schuler, 1985; and Jackson, Zedeck, Lyness & Moses, 1983). Bedeian and Armenakis (1981) presented a causal model in which role conflict and role ambiguity exert direct causal influence on job-related tension, job-satisfaction, and propensity to leave an organization. The path coefficients obtained strongly reinforced their a priori model. A subsequent replication of their study using four different samples of respondents produced results which again supported the model (Kemery, Bedeian, Mossholder & Touliatos, 1985).

Considerable attention has been focused on the negative outcome of such issues as role conflict and ambiguity. However, few studies have investigated the effect of certain work-related attitudes on these phe-

nomena (cf. Van Sell, Brief & Schuler 1981). Since computerization affects quality of work life, some researchers have suggested that computer attitudes should explain role ambiguity and conflict (Kahn, 1981; Giuliano, 1982). Others have proposed that an individual's assessment of career success together with his/her computer attitudes relate to his/her organizational commitment and role conflict/ambiguity (e.g., Gattiker, 1984; Salzman, 1985). Yet these statements still await their test in an organizational setting (cf. Kahn, 1981).

The Model and the Hypotheses

The model presented in Figure 1 incorporates studies about occupational stress, computer attitudes, perception of career success and organizational commitment. The introduction of computers in the workplace may be stressful because it requires adjustment to change and involves adaptation to new roles. Computerization is also assumed to influence the worker's attitudinal as well as behavioral commitment (Van Sell, Brief & Schuler, 1981). Finally, there is the linkage between perception of career success and computerization. Clearly, various issues ahould be taken into consideration in order to understand the effect of computerization on quality of work life.

It is hypothesized that the process through which computerization may create role conflict and ambiguity depends on the individual's computer attitudes and perceived career success, which are also assumed to affect attitudinal and behavioral commitment. This hypothesis is based on the additivity theme prevalent in the literature about stress (Bedeian & Armenakis, 1981; Schuler, 1980) as well as computerization and quality of work life (Gattiker, 1984; Kahn, 1981). The additivity hypothesis states that changes of great magnitude, as can be expected when computerizing, require adjustments by the employee. Such changes could lead to differences in attitudes towards career success, computers, organizational

commitment and role ambiguity/conflict (Gattiker, 1984).

The exploratory nature of this study also suggests a look at other relationships concerning the computerization process and its effect upon quality of work life. Since role ambiguity has been associated with reduced organizational commitment (Van Sell, Brief & Schuler, 1981), it is reasonable to assume that both role ambiguity and role conflict will affect the employee's behavioral and attitudinal commitment.

Insert Figure 1 about here

Method

Design and Subjects

A stratified sample of twenty-eight employers was invited to participate in a survey of their personnel's "computer attitudes and perception of career success." Except for geographic stipulation (Western Canada), organizations were recruited randomly within each classificaton. We chose ten firms from the Globe and Mail annual roster of Canada's largest organizations, 12 medium-sized companies, three educational institutions and three government agencies. Organizational type was not a variable of interest here. The educational and government institutions were included because they brought potentially different organizational cultures and constructs of effectiveness to the sample, thus allowing more reliable generalizations from the findings (cf. Blalock, 1984, chap. 4).

All employers were asked to select three to six successful managers (female and male) and an equal number of support personnel from a variety of departments, and to distribute a questionnaire to these individuals. In order to avoid influencing selection decisions, organizations themselves determined what they considered to be "successful."

Of 380 people asked to take part in the study, 340 agreed and 306 responses were ultimatley received (90%). Completed surveys were returned

directly to the researchers. Respondents included both sexes (about 66% were female) and approximately 65% were married. Of the 306 participants, 196 (64%) were computer users, while the remainder indicated other primary technologies, such as the telephone or typewriter. The analyses performed for this study are based on the sample of 196 computer users.

Instrument

The anonymous questionnaire was designed to assess their present position in terms of success, and also their perception of the technology available to them. It was divided into five segments, with the first eliciting information about subjective success. Two thirds of the 38 items had been developed recently (Gattiker, 1985), with 13 items added for this new study. The second part of the survey instrument related to one's feelings toward computer-based technology. Of 27 items, 16 had already been developed by Gattiker, Gutek and Berger (1985), and 11 more were included in this study.

Organizational commitment was measured by using a previously designed scale, which is a composite of 15 Likert-scale items in a standardized instrument to assess the degree to which the employee is committed to his or her employer. It has been shown to predict turnover reliably and consistently (Mowday, Steers, & Porter, 1979).

The assessment of role conflict and ambiguity was accomplished with a scale developed by Rizzo, House and Lirtzman (1970) which uses six items to measure role ambiguity and eight items for role conflict. These scales were chosen because of their established psychometric properties (Schuler, Aldag & Brief, 1977) and wide usage in role theory reearch. A factor analysis for the present sample confirmed the unidimensional structure of both scales.

Structural Analysis

Statistical tests can be conducted to determine whether sample data

confirm a substantively generated model. Confirmatory factor analysis provides an excellent method when performing the difficult task of removing the effects of correlated errors in measurement of the indicators of any phenomenon studied. LISREL is a maximum likelihood method for testing linear structural relationships, explicitly enabling the researcher to model correlations in the errors, i.e., the residuals (e.g., Kohn, Schooler, Miller, Miller, Schoenbach & Schoenberg, 1983, pp. 105-106; Long, 1983). It provides path coefficient estimates along with approximate t-values to determine the statistical significance of hypothesized individual relations. For comprehensive analysis, this program computes a chi-square goodness-of-fit statistic to assess whether all of a model's hypothesized relations considered together provide an appropriate description of population data. Several LISREL runs were done on the data set of this research, using the computer attitude model introduced earlier (Figure 1). The results obtained with LISREL VI represent the best goodness-of-fit (optimal solution) within the constraints of our conceptual model.

Joreskog (1978) and others (e.g., Maruyama & McGarvey, 1980) have warned that since the chi-square statistic is a direct function of sample size, the probability of rejecting a hypothesized model increases as N increases. Consequently, virtually all models would be rejected as statistically untenable with large samples. In response to this dilemma, previous researchers have recommended two alternatives to the chi-square statistic for assessing goodness-of-fit with causal models: an X^2/df ratio (Boruch & Wolins, 1970) and an incremental fit index (Bentler & Bonnett, 1980). Boruch and Wolins suggest that dividing the degrees-of-freedom for a causal model in the chi-square value produced by the application of the model indicates goodness-of-fit. Schmitt and Bedeian (1982), among others, have considered a 5:1 or 10:1 ratio as a reasonable cut-off.

A second recommended means for estimating the fit of a causal model is

to assess its explanatory power over and above a null model that postulates variables. In applying this notion, Bentler and Bonnett (1980) developed an incremental fit index, delta (Δ), which can be expressed as

$$\Delta_{nm} = \frac{(F_n - F_m)}{F_n}$$

where F_n refers to the chi-square value under the null model previously proposed, and ΔF_m refers to the chi-square value obtained from the hypothesized model. The resulting difference index (Δ_{nm}) lies in the interval $0 < \Delta_{nm} < 1$ and represents the incremental fit of a causal model. The use of delta also provides a measure of the remaining increment in fit possible by the use of a better model, in that the remaining possible increment is equal to $1.0 - \Delta$. While the distribution of delta is unknown, Bentler and Bonnett claim that an incremental value of less than .9 can usually be improved. In the case of samples larger than 100, other researchers contend that an incremental value of less than .95 indicates a poor fit (Bearden, Sharma & Teel, 1982).

Results

Since the LISREL program evaluates the appropriateness of both the measurement model and the structural model simultaneously, additional measured variables are required to achieve identification. In the analysis described here, this identification problem was solved by splitting several of the variables into their constituent parts. Success perception and technology attitudes were divided into subscales (factors) consisting of several items.

The LISREL program also computes a reproduced correlation matrix based on parameter estimates, and applies an X^2 test of significance to the difference between the reproduced and observed matrices. Thus the overall fit of the model to the data can be evaluated. The X^2 test with 52 degrees of freedom is 174.12 ($p<.001$). As Bentler and Bonnett (1980) have pointed

out, the X^2 goodness-of-fit test is insufficient when dealing with structural models because application of this criterion for larger samples leads to rejection of virtually any model as inadequate. Conversely, various competing models will be equally acceptable in smaller samples. While there is no set criterion for the X^2/df ratio, a ratio of less than 10 is considered satisfactory. The X^2/df ratio obtained is 3.35 for this model. According to this rule, our model is a reasonable fit to the data.

Insert Figure 2 about here

We also used LISREL VI to generate a chi-square value for the null model of "modified independence," one that allows exogenous variables to correlate (Bentler & Bonnett, 1980, p. 596). A .90 incremental fit index was obtained by using the formula described earlier. This result supports the hypothesized model, based on Bentler and Bonnett's suggestion.

Insert Table 1 about here

Several comments regarding the reported goodness-of-fit criteria are in order. Since choice of index will obviously influence inferences made regarding the fit of sample data on the hypothesized model, which fit index should be used? Bentler and Bonnett (1980) circumvent this problem by suggesting that the goodness-of-fit should be based on multiple criteria. When the results presented in this paper are viewed within this context, a clearer picture emerges.

As mentioned before, Bearden, Sharma and Teel (1982) contended that with a sample size of >100, the minimum value to be obtained should be .95. Thus the calculated fit index does not show a too good fit of the model, indicating that the hypothesized model could be improved. However,

the magnitude of the X^2/df ratio of 3.35 (Boruch & Wolins, 1970) supported the model obtained with LISREL VI. Based on these results, it appears that the model obtained via LISREL VI represents a reasonably good fit (Bentler & Bonnett, 1980; Schmitt & Bedeian, 1982).

Table 1 lists maximum likelihood parameter estimates for each sample of the model shown in Figure 2, as well as the approximate t-statistic for each path (obtained by dividing its path coefficient by its standard error) and associated p levels. Except for Gamma 1,2, Gama 2,1 and Lambda 5,3, all the estimates are significant, according to the t-values in Table 1.

Discussion

Our results only partially support the model as presented in Figure 1. In the theoretical model, some impact of computer attitudes on workers' organizational commitment was assumed. Individuals who experienced computerization positively also indicated greater behavioral commitment to their organization. Technology attitudes were causally related to attitudinal commitment. In addition, a connection exists between perception of career success and role conflict in that a feeling of career success and life success reduced such conflict for employees. Computerization & career success is causally related to role ambiguity.

Disconfirming findings show, however, that the additivity theme prevalent in the stress literature was not supported when applied to the computerization process. Basic to the model (Figure 1) is the popular notion expressed in the stress and commitment literature that work perceptions have a cumulative effect. The more negative those perceptions, the more role conflict and ambiguity and the less organizational commitment are exhibited by the employee. In these data, perception of career success did not correlate with role ambiguity nor behavioral/attitudinal commitment. Furthermore, LISREL could not identify the causal relationships between computerization & career success and attitudinal/behavioral commitment and

also role conflict. Neither computerization & work nor technology attitudes identified role ambiguity or role conflict.

However, computerization & career success were causally related to role ambiguity, while perception of career success was related to role conflict (e.g., Gattiker, 1984; Latack, 1984; Mowday, Porter & Steers, 1982, p. 56). Evaluation of the hypothesized model actually suggests that an understanding of employee attitudes toward computerization & work as well as his/her technology attitudes do not really explain role conflict/ambiguity. Moreover, neither perception of career success nor computerization & career success explained attitudinal nor behavioral commitment. Nevertheless, the factor computerization & career success does influence a person's attitudinal commitment indirectly by way of role ambiguity. Therefore, questions must be raised about the usefulness and level of explanation to be achieved with such models.

The results do not confirm most research on job and task characteristics which suggests that the variable is a direct antecedent of role ambiguity and conflict. Schuler (1977) postulated that a fit between task and technology determines role ambiguity and conflict. However, the data in this study which measured technology attitudes and computerization & work refute that claim. Instead, these factors relate to organizational commitment only. Even though there is evidence that role ambiguity and conflict correlate with organizational commitment (Jackson & Schuler, 1985), our data could not establish such a causal link, except between role ambiguity and attitudinal commitment.

Gattiker (1984) proposed that perception of career success and the factor computerization & career success would relate to role ambiguity and conflict. However, causality could not be established; while role ambiguity had a causal relationship with the exogenous variable computerization & career success, role conflict actually related to perception of career

success (cf. Gattiker & Coe; in press).

Greater attention should be directed toward the development of analytic techniques which allow the estimation of concepts and models that assume causality. The technique employed in the current paper has been available for some time and should be used more frequently. Applied tests of the proposed model (see Figure 1) are in order but non-existent to date (cf. Jackson & Schuler, 1985).

Several other implications of the standardized solution are also noteworthy. It suggests that by accentuating role ambiguity, attitudinal commitment is increased. However, such adjustments may not always be possible; role ambiguity may be inherent in certain occupations (Jackson & Schuler, 1985). Moreover, if the additivity of attitudes does not apply to the effects of computerization, which intermediary variables should be used to identify possible causal chains? Since conceptual papers and literature reviews imply that computerization may significantly affect organizational commitment and role conflict/ambiguity, extensive applied research is needed to confirm such notions.

Implications for Management and Future Research

Companies computerize to achieve productivity increases and cost savings and to remain competitive. However, employee attitudes must be taken into consideration because they may affect such dimensions as commitment and stress. Performance, turnover and absenteeism are linked to attitudinal measures, making the study of such relationships important to management (e.g., Cammann, 1981). This study represents a step in the right direction. Due to practical constraints, we could not include all known determinants of role conflict/ambiguity and organizational commitment in the present analysis. As a consequence of these omissions, the estimate of the structural parameters relating the endogenous and exogenous varia-

bles in the model investigated may be biased. The effect of such bias on the usefulness of the standardized solution cannot be determined until data are collected on additional unmeasured variables.

The implications of these results are highly complex. An attempt has been made here to expand the research on computer-based technology by studying the causal relationship between user attitudes, perception of career success (exogenous variables), organizational commitment and role conflict/ambiguity (endogenous variables). However, this data set did not identify all causal paths. Our results show that computerization & work as well as technology attitudes do not causally relate to either role ambiguity or conflict. Furthermore, perception of career success and computerization & career success show no causal link to attitudinal nor behavioral commitment. On the other hand, the factor computerization & career success (cf. Figure 2) affects attitudinal commitment indirectly through role ambiguity.

Future research should investigate the causal relationships between the factors assessed in this study and such behavioral outcomes as absenteeism and turnover. It would be of particular interest to see if affective responses as investigated here are causally related to human resource costs. The expansion of such knowledge would be of great benefit to practitioners as they attempt to maintain a high quality of work life while striving for continued organizational effectiveness.

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Table 1

Estimates and standardized solution of the model

Parameter	Estimate(ULS)	t-value[1]
Gamma 1,2	.40	-
Gamma 2,1	.25	-
Gamma 3,4	.65	7.15
Gamma 4,3	.85	4.40
Beta 1,3	-.68	3.29
Beta 2,3	.75	2.65
Phi 2,1	.21	4.03
Phi 4,3	.61	9.70
Lambda-x 1,1	.65	10.19
Lambda-x 2,1	1.00	19.80
Lambda-x 3,2	.35	4.97
Lambda-x 4,2	.99	19.80
Lambda-x 4,3	-.30	4.73
Lambda-x 5,3	-.26	-
Lambda-x 5,4	1.00	9.50
Lambda-x 6,3	1.00	19.80
Lambda-x 7,4	.51	7.15
Lambda-x 8,4	.55	7.76
Chi-square	174.12	
df	52	Incremental Fit Index .90
Chi-square/df ratio	3.35	

Note. Estimates were computed with Lisrel VI. Because single indicators existed for etas, the underlying construct relationship was not estimated.

[1]Non-significant values were not included. All values presented are significant at the .05 level (two-tail test).

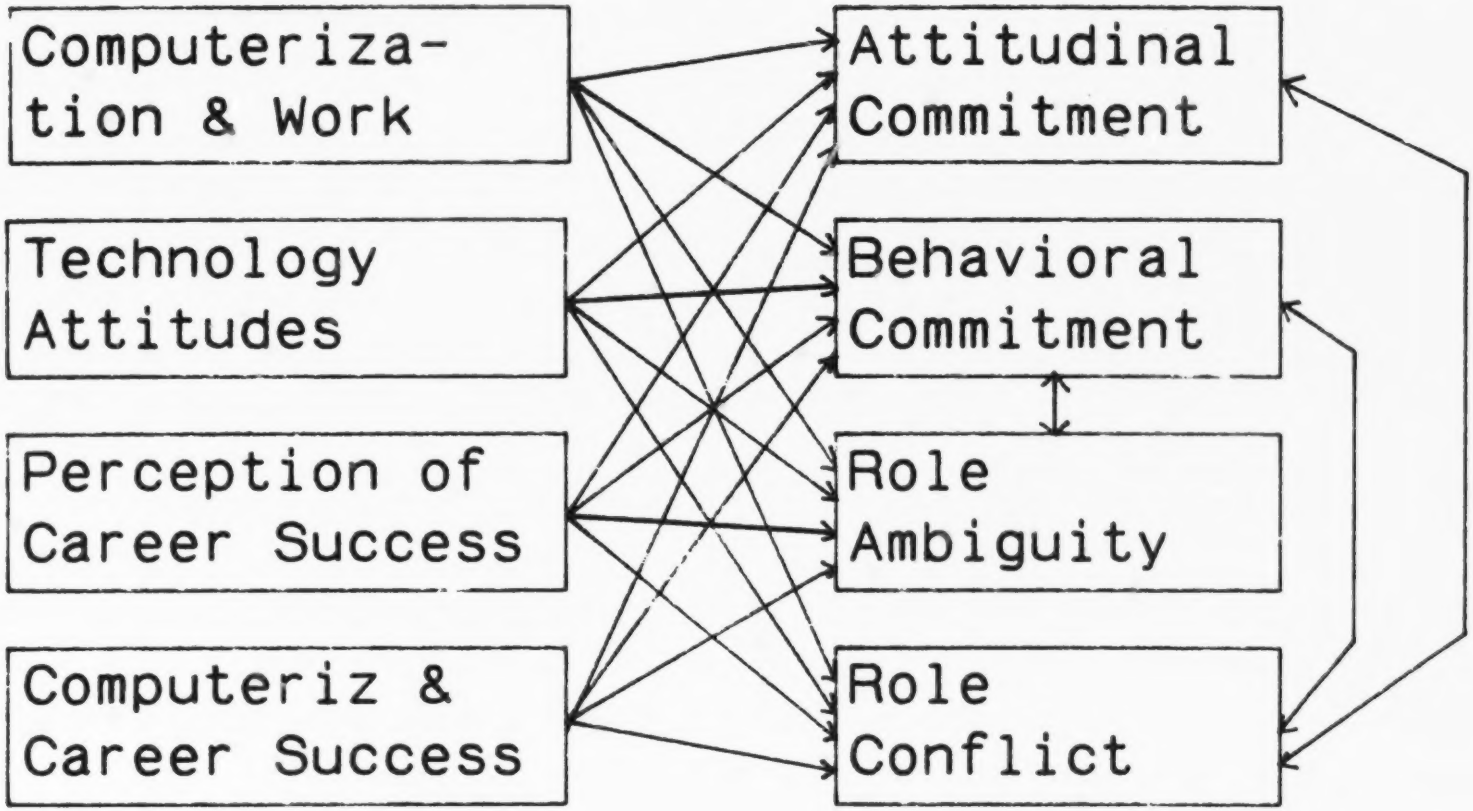

Figure 1. A causal model of the influence of computer attitudes and career success on role ambiguity/conflict and organizational commitment.

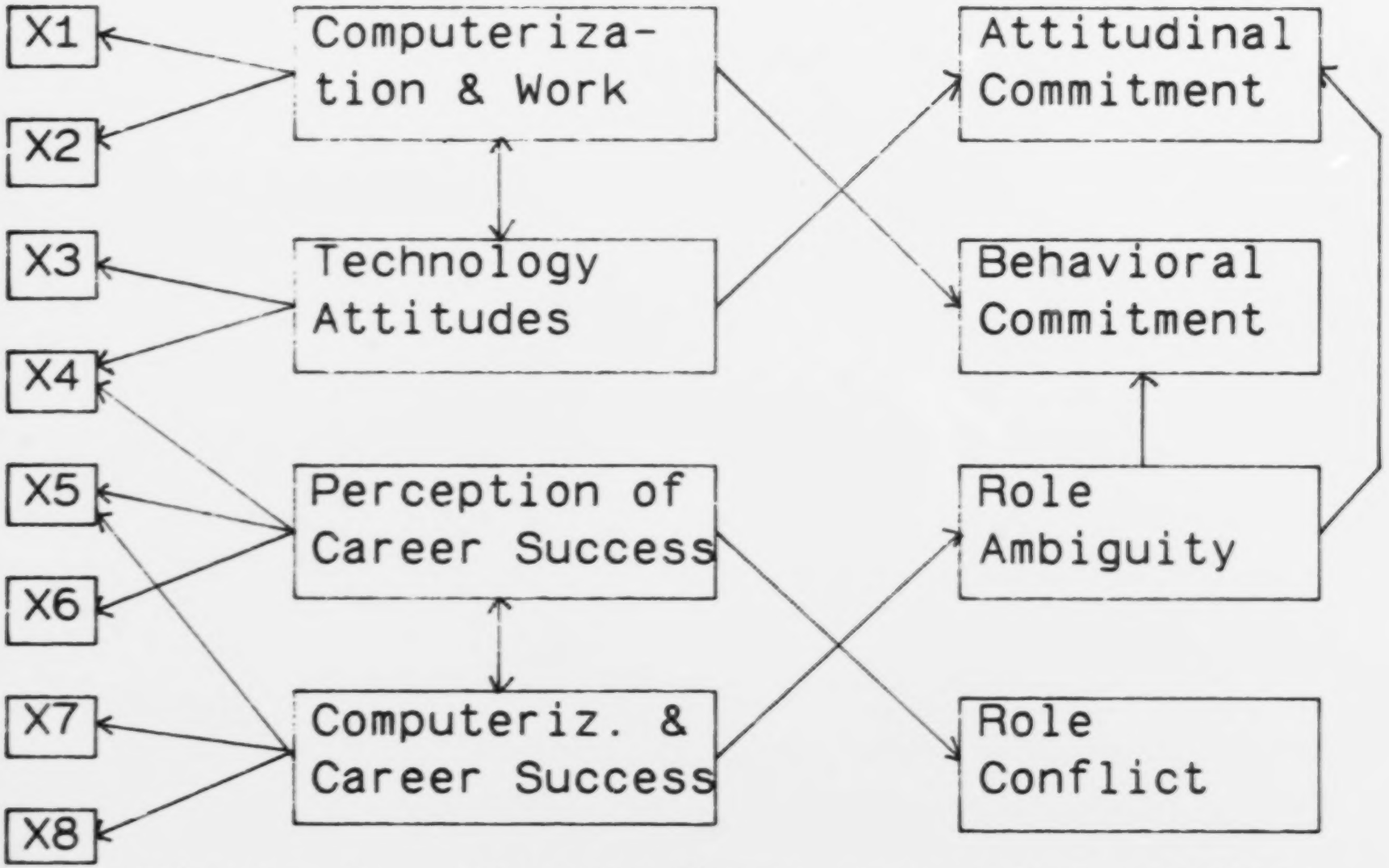

Figure 2. Standardized parameter estimates of LISREL for hypothesized model.